

## **Econ 252 - Financial Markets**

**Spring 2011**

**Professor Robert Shiller**

### **Final Exam – Practice Exam**

#### **Instructions:**

- The exam consists of a total of eleven pages including this coversheet.
- There are two parts to this exam.
- In Part I, answer any sixteen of the twenty questions, five minutes each.  
The total for Part I is 80 minutes.
- In Part II, answer all six questions.  
The total for Part II is 70 minutes.
- For the exam, there are 150 question minutes total, each question minute corresponding to 1 point.
- You have 180 minutes to do the exam.
- The exam is CLOSED BOOK.
- You are allowed to use a non-programmable calculator.

## Part I.

**Answer sixteen of the twenty questions (5 points each - 80 points total).**

1. What is the essential difference in theory between a non-profit and a for-profit corporation? Contrast between the two the roles of equity, debt, and employee bonuses.
2. Your agent tells you that she has anticipated that you will be investing in municipal bonds, and so buys some herself when an opportunity presented itself, expecting to sell them to you from her own portfolio. Is she acting as a broker or a dealer? Explain.
3. Define the multi-factor capital asset pricing model.
4. What does a trust company do?
5. Laura Cha distinguished two issues in modern Chinese financial markets: regulation and enforcement. What was her point?
6. What does Gary Gorton mean by the “run on the repo” and how is that relevant to the financial crisis of 2007-9?
7. What are “operating targets” and “intermediate targets” for the central bank? Give examples of each.

**PART I CONTINUES ON THE NEXT PAGE.**

## CONTINUATION OF PART I.

8. What is the difference between reserve requirements and capital requirements for banks, and what differing purposes do they reflect?
9. What do rating agencies do and what has been the criticism of their activities in the 2007-9 financial crisis?
10. What was Adam Smith's argument about human desire for praise-worthiness? How does this human principle affect financial markets?
11. How (if at all) does securitization of mortgages solve the "lemons problem" and yield an informationally insensitive investment?
12. How are the payouts of Treasury Inflation Protection Securities (TIPS) defined?
13. What did Charles Ellis attribute the success of the investment bank Goldman Sachs to, citing John Whitehead's principles?
14. Ten or twenty years ago, many observers thought that load funds would soon become obsolete, in favor of no-load funds, because so many investment books and magazines advised investors against them. Describe these funds and explain whether load funds have in fact mostly disappeared and why.

**PART I CONTINUES ON THE NEXT PAGE.**

## CONTINUATION OF PART I.

15. What are the “tax risks” associated with municipal bonds? Explain how these risks impinge on investor portfolios. Might the risks cause portfolio fluctuations even in the absence of actual tax changes?
  
16. What is Rule 144a and how does it affect institutional investors as apart from individual investors?
  
17. What did Charles Conant (1904) mean, when he said, “the very sensitiveness of the stock market is one of its safeguards”?
  
18. In the Capital Asset Pricing Model, would a rational person ever short the Tangency Portfolio? Explain.
  
19. What is a certificate of deposit? What difference does it make if it is negotiable or non-negotiable?
  
20. What is the difference between a forward and a futures contract?

**Part II.**

**Answer ALL SIX of the following questions.**

**(Question 1: 10 points, Question 2: 11 points, Question 3: 14 points,**

**Question 4: 8 points, Question 5: 12 points, Question 6: 15 points - 70 points total)**

**Question 1 (10 points)**

Consider the following year-end prices of a hypothetical market index that does not involve any dividends:

Year	Price
2005	500
2006	530
2007	530
2008	519.4
2009	555.76
2010	577.99

(a) **(4 points)** Compute the expected (annual) return of the market index as the arithmetic average of the annual returns of the market index.

Assume that the risk-free rate equals 1.2% and use the above market index as the Market Portfolio.

(b) **(3 points)** Assuming that the CAPM holds, what is the expected return of asset A whose  $\beta$  equals 0.7?

**QUESTION 1 CONTINUES ON THE NEXT PAGE.**

## CONTINUATION OF QUESTION I.

- (c) **(3 points)** Suppose the  $\beta$  of asset A changes from 0.7 to 0.2, but the variance of asset A remains unchanged. What is the new expected return of asset A according to the CAPM? How do you interpret this specific change in  $\beta$  and its impact on expected return?

**Question 2 (11 points)**

For this question, please use the 6-month convention for interest rates.

Suppose that the annualized 12-month spot rate today is 1.5% and that the (annualized) forward rate today between 12 and 30 months equals 2.4%.

(a) **(3 points)** Which spot rate (known today) can you compute from the information above? What is the annualized value of this spot rate?

(b) **(5 points)** Assume that you will collect \$ $a$  ( $a > 0$ ) 12 months from now and describe an investment strategy for this amount of money that allows you to replicate the forward rate today between 12 and 30 months. Importantly, you are only allowed to use the 12-month spot rate and the spot rate computed in (a).

When describing your investment strategy, carefully describe the steps that you take today and the consequences that these steps will have at any future moment in time.

(Hint: In case that you are not able to compute the spot rate in part (a), you can describe the investment strategy by referring to the missing spot rate as  $z$ .)

(c) **(3 points)** What is the main idea behind the Pure Expectations Theory? What is today's expectation of the 18-month spot rate 12 months from now according to the Pure Expectations Theory?

## Question 3 (14 points)

You are an investor in a world where **short-selling assets is prohibited**.

Suppose that the price of asset X in period 0 is \$200. This asset will pay a dividend of \$8 one year from now in period 1. Let the riskless interest rate from period 0 to period 1 be 5%.

Assume the price for a futures contract with delivery in period 1 is \$210.

(a) (7 points) Can you make an arbitrage profit when this is the price? If so, state specifically what financial transactions you would make in period 0 and period 1 to realize a profit. If not, explain why not.

Now, assume the price for a futures contract with delivery in period 1 is \$190.

(b) (7 points) Can you make an arbitrage profit when this is the price? If so, state specifically what financial transactions you would make in period 0 and period 1 to realize a profit. If not, explain why not.

**Question 4 (8 points)**

Consider a portfolio problem in which the Efficient Portfolio Frontier gives rise to a Sharpe ratio of 0.12. The risk-free rate is equal to 2%.

- (a) **(2 points)** If the expected return of the market portfolio equals 5%, what is the return standard deviation of the market portfolio?
- (b) **(2 points)** What is the statement of the Mutual Fund Theorem? Does it allow you to conclude which exact portfolio an agent will choose without knowing the risk-return-preferences of this agent?
- (c) **(4 points)** Besides the market portfolio and the risk-free “portfolio”, consider portfolios A and B, both located on the Tangency Line. Portfolio A puts weight 0.06 on the market portfolio and weight 0.94 on the risk-free asset. Portfolio B puts weight 0.72 on the market portfolio and weight 0.28 on the risk-free asset. Assume that the utility that an agent derives from any portfolio is given by

$$u(\text{portfolio}) = \mu - 4\sigma^2.$$

That is, the utility of the portfolio is its expected return minus four times its variance. Which of the four aforementioned portfolios does the agent choose?

(The portfolio that the agent chooses among the four aforementioned ones is actually the portfolio that the agent chooses among all portfolios on the tangency line, which is however something that you should not prove, i.e. you do not receive any additional points if you show a proof.)

(Hint: If you could not solve part (a), use a return standard deviation of 30% for the market portfolio.)

**Question 5 (12 points)**

Assume that all call and put options mentioned below are European style, have the same maturity date and are written on stock ABC.

Moreover, ignore any discounting between the date at which an option is purchased and the date at which it matures.

Stock ABC costs \$25 today.

(a) **(6 points)** Suppose an investor purchases a “married put”. That is, she buys one unit of a put option  $P_1$  with a strike price of \$20 and one unit of stock ABC. The put option  $P_1$  costs \$10.

Draw the payoff and profit of the portfolio.

Judging from your graph, why do you think an investor might want to construct this portfolio?

(b) **(6 points)** Suppose an investor purchases a “bear put spread”. That is, she buys one unit of the put  $P_1$  from part (a) and sells a put option  $P_2$  with a strike price of \$15. The put option  $P_2$  costs \$8.

Draw the payoff and profit of the portfolio.

Judging from your graph, why do you think an investor might want to construct this portfolio?

**Question 6 (15 points)**

The price of XYZ stock is currently \$120. The stock price will either increase by a factor of  $u=1.5$  or decrease by a factor of  $d=0.5$  in each of the following years.

(Stock increases and decreases in different years are independent from each other.)

The annual risk-free rate for the next two years is constant at 5%. XYZ stock does not pay any dividends.

First, consider a European call option  $C_1$  written on XYZ stock with a strike price of \$60, which matures in 1 year.

(a) **(2 points)** Suppose that an investor wants to create a portfolio today that generates the same payoffs in both states of the world in 1 year, using XYZ stocks and the call option  $C_1$ . Calculate the number of XYZ stocks, which an investor should purchase per call option  $C_1$  that he sells.

(b) **(3 points)** What is the price of the call option  $C_1$  today?

Now, consider another European call option  $C_2$  written on XYZ stock with a strike price of \$60, which matures in 2 years.

(c) **(6 points)** What is the price of  $C_2$  a year from now after the price has gone down once? What is the price of  $C_2$  today?

(d) **(4 points)** Using your answer in part (c) and the put-call parity, calculate the price of a 2-year put with the same strike price as  $C_2$  a year from now after the price has gone down once. Additionally, what is the price of this put option today?